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CEREAL CROPS IN THE PANHANDLE OF TEXAS.

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CONTENTS.

INTRODUCTION.

There is a growing demand for information regarding crops that are adapted to the Panhandle of Texas. This demand is indicated by the large number of letters of inquiry received. Many of these inquiries come from people who already are living in the Panhandle. Others are from nonresidents who own land there, and many come from persons who are looking for a place to acquire a home. They need definite facts, so far as these are available, on which they can make decisions and take action. They need the results of the experiments that have been conducted in that section, plainly and briefly told.

It is the aim of this paper to tell the farmer, landowner, or prospective settler what has been learned about the cereal crops through cereal investigations in the Texas Panhandle.

The suggestions made herein are not considered final. They are the conclusions drawn from experiments conducted and observations

made from 1903 to date. It is hoped that they will form at least a working basis for farming operations in the section discussed.

The points at which experiments have been conducted by the United States Department of Agriculture are Amarillo, Channing, Dalhart, and Chillicothe, Tex. A view of the farmstead of the Amarillo Cereal Field Station is shown in figure 1.

Amarillo is a little northwest of the center of the Texas Panhandle. Channing is about 50 miles and Dalhart 83 miles northwest, while Chillicothe is about 150 miles southeast of Amarillo. The most complete series of experiments has been conducted at Amarillo.

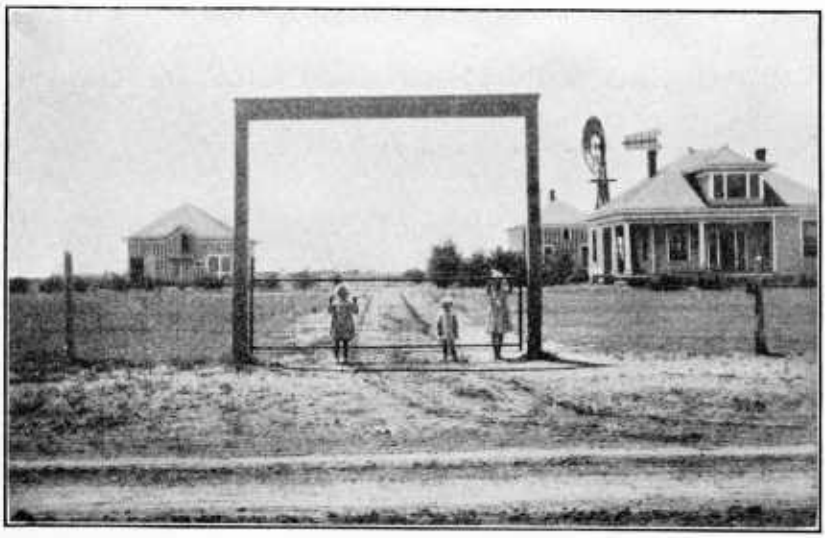

FIG. 1.—Farmstead of the Amarillo Cereal Field Station in July, 1914, showing the buildings and the black-locust grove.

The crops that are discussed in this paper are wheat, emmer, spelt, rye, oats, barley, and proso. Brief mention is made also of the grain sorghums and corn, which are discussed more fully in other available bulletins.

THE PANHANDLE.

The Panhandle is that part of northwestern Texas which extends northward from the main body of the State. In common practice this term is usually applied to the entire northwestern part of the State, above the cap rock, including the so-called Staked Plains. The word is here used in the broader sense. Figure 2 is a sketch map of this region. The results given in these pages are applicable to all the district lying above the level of 2,000 feet and to a considerable extent to lower elevations. They apply largely also to adjacent similar areas in New Mexico, Colorado, Oklahoma, and Kansas.

TOPOGRAPHY.

The western two-thirds of this district is a high and nearly level table-land with an average altitude somewhat less than 4,000 feet and with a rather uniform slope to the east and southeast. The

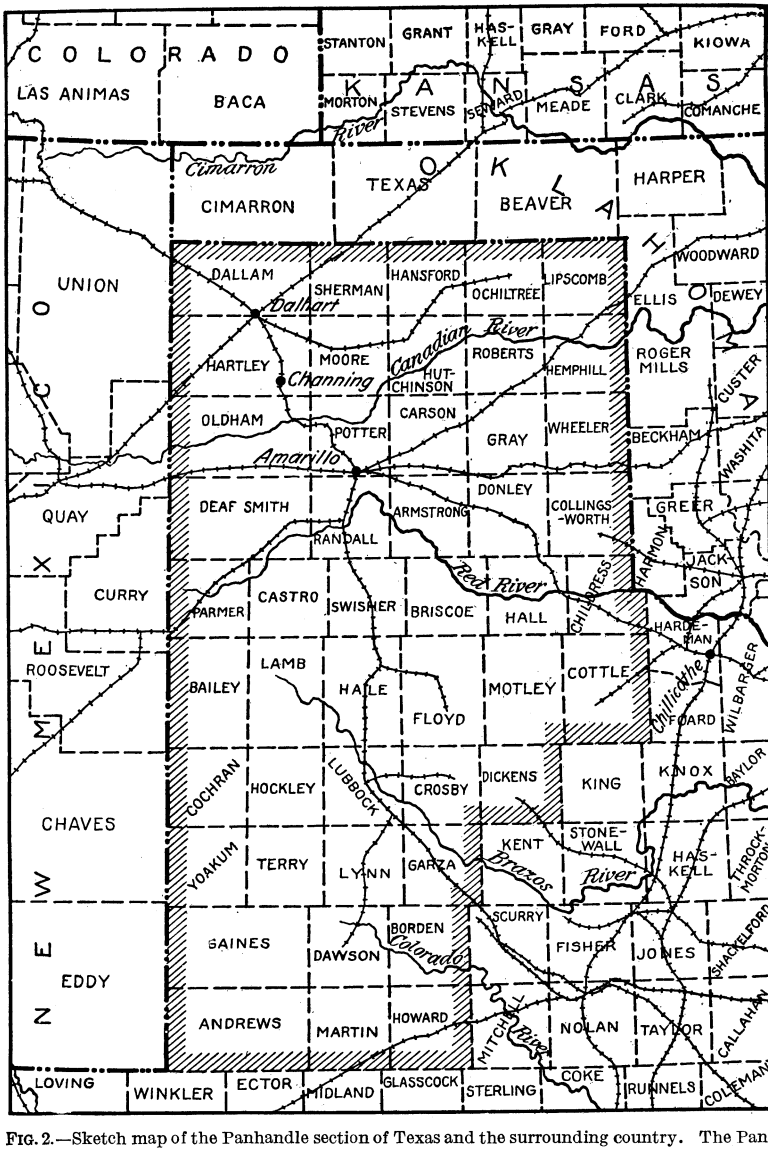

FIG. 2.—Sketch map of the Panhandle section of Texas and the surrounding country. The Panhandle section as discussed in this bulletin is indicated by the shaded boundary.

highest elevation reached is about 4,800 feet in the extreme northwest, while the southeastern border, roughly the line of the cap rock, has an altitude of only 1,500 to 2,000 feet. East of the nearly

level high plains is a rough, broken area where the cap rock is worn through and erosion is more rapid. Still farther eastward, below the cap rock, the country is rolling.

Drainage is eastward through the tributaries of several rivers. In the high plains above the cap rock, these streams tend to form canyons, the most notable of these being Paladora Creek, extending from Canyon, in Randall County, eastward for 60 miles.

SOIL.

The soil varies from a light sand in some parts to a heavy clay or adobe in others. Much of the northwestern part of the Panhandle north of the Canadian River is quite sandy. Sandy land is also found in Bailey County and along the Canadian and Red Rivers. Taking the Panhandle as a whole, the heavy clay-loam soils predominate. The sandy soil is covered with bunch grasses, while the clay soil is covered with buffalo, curly-mesquite, and blue-grama grasses. These soils are quite fertile, but are lacking in humus, owing to the scanty growth of native vegetation. This lack of humus lessens the capacity of the soil to absorb the moisture which falls upon it. The heavy clays and clay loams become compact and bake readily after heavy rains.

CLIMATE.

The climate of the Texas Panhandle is quite similar to that found generally in the Great Plains. The rainfall is limited and irregular. It is not equally distributed either as to time or place. Much of the rain comes in heavy showers and the loss due to run-off is sometimes very great. The air is quite dry. There is an unusual amount of wind, and evaporation is very high. There are frequent and sudden changes in temperature, both in winter and summer. The nights are cool throughout the summer, except in the lowest parts of the east and south.

RAINFALL.

The rainfall over the Panhandle is limited. It varies from 15 inches in the western part to about 25 inches in the eastern and southeastern parts. The average annual rainfall at Amarillo for the 24 years from 1892 to 1915, inclusive, has been 21.21 inches. Three-fourths of this comes during the growing season, from April to September, inclusive. The seasonal rainfall is sometimes very irregular in its distribution, as to both time and locality. The larger part of the rainfall for one month may come at its beginning, while that for the next month may not come until the latter part. Thus a severe drought, 4 to 6 weeks long, could have occurred between the two rainy spells, although the rainfall for the two months was about normal.

Many of the rains during the summer are very local in extent. Heavy showers may occur at different points, with stretches of almost

no rainfall between. To illustrate the variation in rainfall the following example is given: On July 4, 1914, local showers fell in many places in the Panhandle. The rainfall at the Weather Bureau station in Amarillo was 1.71 inches, while at the Cereal Field Station, 2½ miles distant, it was only 0.22 inch. Thus the rainfall at the Weather Bureau station on that day was nearly eight times as much as that at the field station. Differences of this kind may occur, and frequently do, in any part of the Panhandle.

The rain often falls so rapidly for a short time that much of the water is unable to soak into the soil. This is the case on heavy clay and adobe soils, and on such soils there is often a heavy run-off. For

FIG. 3.—View of a part of the Amarillo Cereal Field Station on August 15, 1907, showing the enormous run-off after a torrential summer rain.

this reason a heavy rain is sometimes of very little benefit to crops. These beating rains make matters worse by puddling the surface, which afterward bakes into a hard crust. When this happens shortly after seeding, the young plants are unable to break through this crust. Figure 3 shows the run-off after one of these torrential summer rains. During these heavy rains the more sandy soils take in the moisture nearly as fast as it falls. They do not puddle and afterwards bake like the heavy clay and adobe soils.

HUMIDITY.

On the average, the air over the Panhandle is very dry. It therefore takes up moisture wherever it can get it, from the soil and from the plants themselves. The plants are hindered in their growth and

may even be killed. In extreme instances, where the plants are actually killed, the moisture is taken from the plant above the ground faster than it can be supplied by the roots.

WIND.

The Texas Panhandle is very windy during the whole year, the general direction of the wind being from the southwest. The wind blows so much from this one direction that trees are bent toward the northeast. Quantities of soil are moved by the wind when it is high. Soil blowing, especially on the light clay and sandy soils, may do much damage to crops. The winds also cause loss of grains, such as oats and proso, by shattering at the time of ripening. Winds are general over the entire Panhandle country, but have a greater sweep over the high level plains than over the more rolling section in the east and southeast.

The average hourly wind velocity, as shown by the Weather Bureau records at Amarillo, Tex., for the years 1905 to 1915, inclusive, is 11.5 miles. An hourly velocity of 40 miles is reached several times each year, and at times the velocity is much higher. The highest recorded velocity at Amarillo was 84 miles, on April 5, 1895.

EVAPORATION.

The evaporation of moisture from the ground and from the crops themselves is very great. This is caused by the dry air and continuous wind. In periods of drought and high winds it reaches a maximum. The average evaporation from a free water surface for the growing season, April 1 to September 30, at the Amarillo Cereal Field Station for the years 1907 to 1915, inclusive, was 53.2 inches. This rate of evaporation would hold generally for all the Texas Panhandle on the high plains. In the more broken parts to the east and southeast and at the lower elevations, the evaporation probably is less. The evaporation from the soil can not be given in definite quantities, but where the winds are high and dry it is very great.

TEMPERATURE.

The changes in temperature in the Panhandle are more violent than in sections to the eastward. The highest temperatures are much lower than might be expected when the altitude is not taken into consideration. In summer the days are hot and the nights cool. These cool nights retard the growth of many of the crops. In winter severe cold weather occurs, but there are many days between the cold spells when field work can be done. In spring and fall changes in temperature from very warm to very cold occur quite often.

The maximum temperature in summer very rarely reaches 100° F., while the minimum in winter almost as rarely reaches zero. At the

Weather Bureau station at Amarillo the highest recorded temperature is 105° F., and the lowest −15° F. The average yearly temperature is 56° F. The difference between the averages of the highest and the lowest daily temperatures, however, averages only about 24 degrees F. throughout the year over the whole Panhandle.

The average date of the last killing frost in spring at Amarillo is April 19, and that for the first killing frost in the fall is October 29. This gives an average frost-free period of 195 days. In the extreme northwestern part of the Panhandle this frost-free period is shortened about 10 days, while in the southeastern portion it is lengthened about as much.

FARMING IN THE PANHANDLE.

Farming in the Texas Panhandle was almost an unknown thing 20 years ago. The land was occupied by immense cattle ranches and was used only for grazing purposes. The short but nutritious grasses furnished both summer and winter pasturage. Each animal required from 15 to 40 acres of this grazing land, depending on the nature of the grass cover, the character of the season, and the time of year. Finally, the range became overstocked, and as a result heavy losses occurred during the seasons of drought and in severe winters. This created a need for feed crops suitable for growing on the Plains. At the same time the demand for new, cheap lands for homes and crop production was increasing. The large ranches were divided and portions sold for farms.

Within the last 10 years the settlement of this Plains country has made steady progress. There have been several dry years during this period, and consequently many failures. These failures have greatly stimulated the growing of crops that have been found adapted to the Panhandle country. The cereal experiments conducted at different points have been of great value in determining what crops and crop varieties are adapted to this high Plains country. A view of the first farm on which experiments were conducted at Amarillo is shown in figure 4.

When the change from cattle ranches to crop farming first began, the tendency was to grow crops only and to neglect stock. This is true still to a large extent, but mixed farming, the raising of both stock and crops, is rapidly gaining favor. Feed crops, both grain and forage, are successfully grown. Large markets are distant, and many communities still far from the railroad find transportation difficult. Mixed farming is the logical solution of these problems and is the only profitable type of farming under Panhandle conditions.

The small grains, therefore, are of minor importance here. Some have their place, however, in the farming scheme, and a knowledge of which ones to grow and how to grow them is important.

HOW TO GROW SMALL GRAINS.

The growing of winter grains, on the whole, has been more successful than the growing of spring grains in the Texas Panhandle. Winter wheat is the most important of the winter grains, while spring oats is the only spring small grain that has given even fairly profitable yields. More wheat than oats is grown in the Panhandle. The winter-wheat crop is of much more importance than spring oats as a money crop. Both these crops can be used to advantage in a general farming system.

PREPARATION OF LAND FOR WINTER GRAINS.

Land that is to be used for the growing of winter grains should be prepared as early in the summer as possible. It should be plowed to a depth of at least 6 inches. This plowing should be well done;

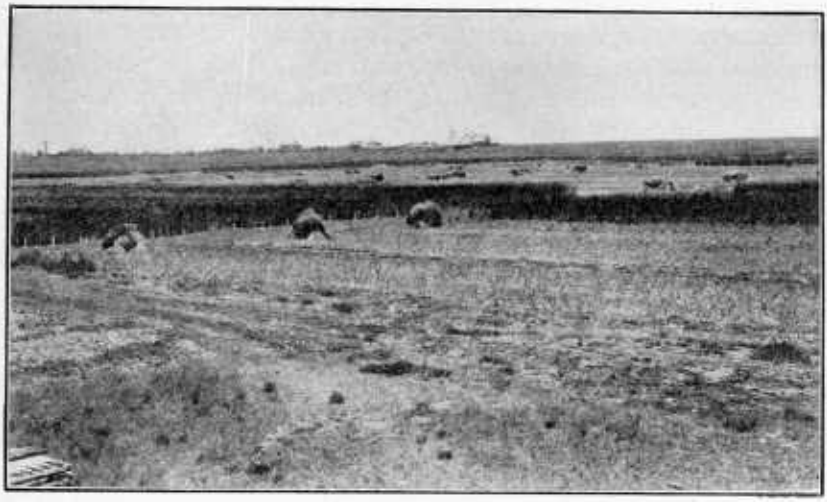

FIG. 4.—The first experiment farm at Amarillo, Tex., on June 19, 1908, showing small grains in shock. A dairy farm is seen in the middle background.

all the land should be turned. Weeds should not be allowed to get a start. In the work of keeping down weeds, care must be taken not to fine the surface soil too much on either light or heavy soils. Land that is made fine on the surface will blow more than if left somewhat rough. Where land is prepared just before seeding, better results are obtained from disking than from plowing. This late preparation of land, however, is not good farm practice.

Increased yields are obtained from alternating summer fallow and crops, but the increase is not large enough to pay for the extra work of maintaining the fallow.

It usually is impossible to follow most sorghum crops with winter grains. The sorgos and kafirs grow late in the fall and leave the soil dry. It therefore is better to grow some leguminous crop like cow-

peas the next year after the grain sorghums have been grown. When late fall and winter rains have been abundant, spring grains may follow grain sorghums.

PREPARATION OF LAND FOR SPRING GRAINS.

In preparing land for spring small grains following another small-grain crop, fall plowing is better than spring plowing. Furrowing with a lister and leaving the ground rough during the winter is practically as good as plowing for spring oats and a little better than plowing for spring wheat. The cheapest preparation for oats is disking after corn; but, as corn is not a good crop to grow in much of the Panhandle, this method rarely can be used. Where small grains follow sorghums, plowing usually is necessary because of the drier ground and heavy stubble. The same care should be taken in doing the plowing for spring grains as for winter grains. Land that has been fall plowed will need disking in the spring before seeding if the surface soil has crusted badly from winter snow or rain. If this crust is not too heavy the drill will break it sufficiently in seeding.

PREPARATION OF SEED.

GOOD SEED.

It is very important that good seed be used. It should be pure as to variety, free from weed seed and other impurities, well matured, of strong vitality, and home grown as far as possible. In all tests with seed from various localities compared with home-grown seed, the latter has always given the best average yield. The farmer is urged to select his own seed and to keep it clean and pure. Running the seed through a fanning mill once is recommended, to remove weed seed, trash, and light, small kernels.

TREATMENT FOR SMUTS.

There is considerable loss from smut in small-grain crops every year. The larger part of this loss is easily prevented by treating the seed before sowing with a formaldehyde solution composed of 1 pound of 40 per cent commercial formaldehyde to 40 gallons of water. Either of the methods described below is effective for the common bunt or stinking smut of wheat, the loose smut of oats, and the covered smut of barley.

(1) Spread the grain to be treated upon a clean floor or upon a tarpaulin spread thereon and sprinkle the formaldehyde solution over the grain. The grain should be stirred thoroughly while being sprinkled, and the process should be continued until every kernel is wet. Then cover the grain with a canvas or some other heavy material and allow it to lie one hour. It should then be uncovered and stirred occasionally until dry. It is then ready for seeding.

(2) Prepare the formaldehyde solution in barrels. Put the grain to be treated in burlap sacks. Do not fill the sacks too full. Immerse the sacks in the solution for 10 minutes; then hang them up to drain and dry. The sacks should be shaken occasionally, to hurry the drying process.

The loose smuts of wheat and barley may be controlled by a different method, the modified hot-water treatment. This consists in soaking the seed in cold water for five hours. Wheat is then soaked in hot water at 54° C. for 10 minutes and barley at 52° for 15 minutes. This treatment for loose smut is more difficult to perform than the formaldehyde treatment. Great care should be taken to have the temperature of the water just right.[1]

SMALL-GRAIN CROPS.

Small-grain crops, though of minor importance when compared with the grain sorghums, are important enough to demand the attention of the farmer. They can be used readily in a rotation with grain sorghums if the latter are followed by some leguminous crop like cowpeas. The small grains bring good prices ordinarily and are in demand for home use and for shipment. They do not return much profit themselves, but in a general farm system where they make up a minor part of the total crop they may be quite valuable.

Winter wheat is the only small-grain crop that has been grown very extensively in the Texas Panhandle. In the last two years it has been a very important crop. The price per bushel has been high and the yields exceptionally good over a large part of the Panhandle country. Considerable spring oats has been grown also.

In the following paragraphs each crop is discussed as to its adaptability, importance, yield, quality, varieties, and rates and dates of seeding. Its rank in the list of crops that can be profitably grown in the Panhandle of Texas is also given.

WHEAT.

Wheat is by far the most important of the small-grain crops grown in the Panhandle. In 1909 the State of Texas was credited with 320,000 acres of wheat and a total production of 2,561,000 bushels. For 1915 the area in wheat was estimated as 1,475,000 acres and the total production as 22,862,000 bushels. This is an increase of 360 per cent in area and 800 per cent in yield.

The newly developing Panhandle country has increased its wheat area more rapidly than the older parts of the State. The Panhandle wheat area in 1909 was 88,170 acres. The yields were very low that year. A very careful estimate places the Panhandle area in wheat in 1915 at 550,000 acres, with an average acre yield of 20 bushels. This makes 11,000,000 bushels, or about half the wheat grown in the State. This increased Panhandle acreage in 1915 was due to two causes, (1) to the good yields and high prices obtained in 1914 and (2) to the development of new communities in the Panhandle. This wheat

[1] Full directions for the treatment of all grain smuts are given in Farmers' Bulletin 507, entitled "The smuts of wheat, oats, barley, and corn," which may be obtained free on application to the United States Department of Agriculture.

acreage is distributed to some extent over the whole Panhandle, but by far the larger part is in the east-central and northeastern section.

Judged by the large yields in 1915, wheat might be considered a rival of the grain sorghums. When the average yields of the two crops are considered for a number of years this apparent rivalry disappears.

WINTER WHEAT.

The wheat grown in the Panhandle of Texas is almost entirely winter wheat. Winter varieties are much better adapted to this section than the spring wheats.

The winter wheats that are best adapted are the hard red, or Crimean, group, of which the Turkey, Crimean, and Kharkof are well-known varieties. The Turkey is the leading variety in the tests at the Amarillo Cereal Field Station, with an average yield for 10

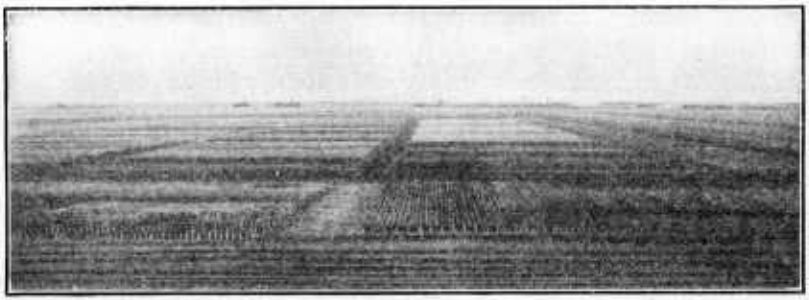

FIG. 5.—View looking south over the Amarillo Cereal Field Station in June, 1912, showing the cereal nursery in the foreground and field plats in the rear. Note the level surface of the Plains.

years of 13.2 bushels per acre. The Beloglina wheat comes next, with an average yield of 12.2 bushels per acre. The Crimean and Kharkof wheats are varieties very similar to the Turkey. A view of the experimental plats at this station is shown in figure 5.

Farther east the soft or semihard red winter wheats are grown. Well-known varieties are the Mediterranean and Sibley Golden. At Amarillo the Diehl Mediterranean, a semihard red wheat, ties the Crimean for third place in yield. It has the advantage of having longer straw than the hard red varieties but the disadvantage of shattering more if not harvested as soon as ripe.

Wheat should be sown about October 15, though any time from October 1 to November 1 will give good results in the average season. The amount of moisture in the soil at seeding time and the weather conditions during the winter and spring have as great, if not a greater, influence upon the subsequent yield as the date on which the crop is sown.

Three pecks per acre is the rate recommended, and even lighter seedings have given excellent results. The rate of seeding will depend

upon the quality of the seed, the amount of moisture in the soil, and the time of year the seeding is done. Good seed can be sown at a lighter rate than poor seed. Less seed is necessary on land that has plenty of moisture than where the soil is rather dry. Much of the seed may not germinate in soil that is lacking in moisture. Where the seeding is done early, less seed can be used than where seeding is late.

In a word, use good seed of the Turkey type and sow at the rate of 3 pecks per acre about October 15 on well-prepared land.

SPRING WHEAT.

Spring wheats, both the durum and common varieties, have proved much inferior in yield to the winter wheats. Practically no spring wheat is grown by the farmers in the Panhandle. It is not necessary, therefore, to devote much space to discussing this crop. Among common wheats the Fretes is the best variety, according to the results of a 10-year test. The Humera, which has been grown in field plats at Amarillo only four years, has given promise of being better than the Fretes.

The better yielding durum wheats are the Saragolla, Marouani, and Kubanka, in the order named. Neither the common spring nor the durum wheats can be recommended for growing in the Panhandle.

EMMER AND SPELT.

Emmer and spelt are closely related to wheat, but are grown for feed and not for making flour. They are similar in feeding value to oats and are used for much the same purposes. The kernels remain inclosed in the glumes, or hulls, after thrashing, as do most oats. The straw is of little value as feed. These grains are not as hardy as winter wheat. They should be seeded at the rate of 5 pecks per acre. The best time to sow is early in October.

There are both winter and spring varieties of emmer. Both have been grown in the Panhandle. The spring variety generally has very short straw and is not as good a yielder as the winter variety. Only the winter variety of spelt has been grown. Black Winter emmer has produced an average yield of 16.9 bushels for the 10 years, 1906 to 1915, inclusive.

Red Winter spelt has an average yield of 20.1 bushels per acre for the 10-year period just mentioned. This is a greater yield than was produced by the emmer. The emmer, however, makes up in feed value by having a thinner and softer hull than the spelt. This makes the emmer a slightly more desirable feed. Neither of these crops yields as well as the better varieties of oats. For this reason they are not recommended as good crops for this section.

RYE.

Only winter varieties of rye have been grown with any degree of success. Spring rye has not given even a promise of making good. Winter rye is more winter hardy than winter wheat, but does not equal that grain in yield. It nearly always comes through the winter in good shape and makes a vigorous growth in the spring. If sown early it makes good pasturage both in the fall and in the spring. It is no better than wheat, perhaps, for pasturage, but on account of its winter hardiness it should be used more commonly than it now is by the farmer.

Two varieties of winter rye, one called the Kansas, originally obtained from that State, and the Ivanof, imported from Russia, have been grown for 10 years at the Amarillo Cereal Field Station and for shorter periods at Channing, Chillicothe, and Dalhart. For the 10 years, 1906 to 1915, the average yields per acre at Amarillo were 11.3 bushels for the Kansas and 10.1 for the Ivanof. In appearance and manner of growth these two varieties are quite similar. The straw is always of good length to bind securely.

Winter rye has made very low grain yields some years, but has never failed to produce more seed than was sown. This can not be said of the wheats. When rye is to be used for pasturage it should be sown early in September at about 4 pecks per acre, and when grown for grain it should be seeded about the middle of October at 3 pecks per acre. Very little rye is now grown in the Panhandle.

OATS.

The total value of the oat crop of Texas in 1915 is given as $18,638,000, compared with $24,462,000 for wheat. The same ratio does not hold for the Panhandle district, however, where oats is entirely a spring crop. Here the area devoted to oats is only about half that used for growing wheat. Next to winter wheat, spring oats is the best small-grain crop. At the Amarillo Cereal Field Station for the 10 years from 1906 to 1915 the average yield of the best variety was 21.9 bushels per acre. This is not a large yield and would return only a small profit.

While the yields are not large, the oat crop in the Panhandle has never failed entirely to make grain. It has made better yields than either emmer or spelt and is considered a better crop by the farmers. It has given uniformly better results than other spring small grains.

The Rustproof group of oats, of which the Red Algerian and Red Rustproof, or Texas Red, are good examples, has given the highest yields. The varieties of this group have large reddish brown kernels. These are really winter oats, but are grown from spring seeding in the Panhandle.

The Burt group has smaller kernels, which are quite variable in color, ranging from yellowish brown to dark brown or almost black. They are often quite distinctly striped. A typical variety of this group is the Burt, C. I. No. 293. It matures a little earlier than the Rustproof group and has produced slightly lower yields.

The Sixty-Day group, which includes the Sixty-Day and Kherson, ranks third in yield. The varieties of this group have small yellow kernels. They ripen between the Burt and the Rustproof.

Oats should be sown early in the spring in the Panhandle. March 1 is the best average date. The rate that has given the best results is 5 pecks per acre.

All varieties of oats shatter more or less and should be harvested as soon as ripe.

BARLEY.

Barley has not been a successful crop in the Texas Panhandle. Spring barley has made very poor yields, averaging less than 10 bushels per acre. Winter barley has made much better yields than spring barley, but only one variety, the Tennessee Winter, has given any promise of making a crop worth while. The average yield per acre of this variety in the 10 years, 1906 to 1915, inclusive, is 14.4 bushels of 48 pounds. In the number of pounds produced per acre it is somewhat lower than the best oat variety for the same period. It failed entirely, due to winterkilling, in two years, 1907 and 1909. Winter barley should be sown about the middle of October at the rate of 5 pecks per acre. Barley is not recommended as a crop for the Panhandle of Texas.

PROSO.

Proso (*Panicum miliaceum*) is a species of millet introduced into this country from Russia. It is often called "hog millet" and "broomcorn millet" in the United States. It is grown for grain and not for hay. The grain is of value for feeding to stock, particularly to hogs, sheep, and poultry. Young chicks are especially fond of it. The chief value of this crop to the dry-land farmer is its earliness. Proso can produce a crop of seed in two months or less from the time of seeding and so may be used as a catch crop.

There are several varieties of proso, the differences being mainly in the color of the seed and the length of the straw. Some varieties have short and some have long straw, but the leaves are few in all. A black-seeded sort, the Black Voronezh, has produced the best average yield (11.8 bushels) per acre in the nine years, 1907 to 1915, inclusive. This is the variety recommended for use in the Panhandle. Sowing may be done in the latter part of May or in June, using 20 pounds of seed per acre. The seed can be sown with an ordinary

drill. Proso is harvested with a grain binder and thrashed the same as the other small grains.

This crop should be tried for home use, but it is not likely to be profitable if grown for market.

RELATIVE RANK OF THE SMALL-GRAIN CROPS.

The small-grain crops in the Panhandle of Texas rank in the following order, on the basis of average yields:

1. Winter wheat.
2. Spring oats.
3. Winter barley.
4. Winter rye.
5. Proso.
6. Durum spring wheat.
7. Common spring wheat.
8. Winter spelt.
9. Winter emmer.

Those recommended to be grown rank as follows:

1. Winter wheat.
2. Spring oats.
3. Winter rye.
4. Proso.

GRAIN SORGHUMS AND CORN.

The grain sorghums, especially the milo, kafir, and feterita varieties, are the most important grain crops for the Panhandle of Texas. About three-fourths of the total cultivated area is devoted to these crops. They can be profitably grown in practically the whole section. They are not discussed in detail in this paper, however, as several bulletins on them are already available. See the list given at the end of this bulletin.

Corn is grown in the Panhandle in a limited way. The acreage devoted to its production is small and somewhat scattered. Most of it is grown in the east-central part just below the cap rock and along the Canadian River. It can not successfully compete with the grain sorghums either in total tonnage or in yield of grain per acre. The quality of the crop produced usually is poor, owing to earworm injury. Bulletins discussing this crop on the Great Plains are available.

CROP VARIETIES RECOMMENDED.

The varieties of small grains that are recommended for the Panhandle may be summed up as follows:

(1) *Winter wheats.*—The hard red varieties belonging to the Crimean group, such as the Turkey, Kharkof, Crimean, and Beloglina.

(2) *Spring oats.*—The large red oats of the Rustproof group, represented by Red Algerian and Red Rustproof. These are really winter oats but are here grown from spring seeding.

(3) *Winter rye.*—Any good winter variety.

(4) *Proso.*—The earlier maturing varieties, of which Black Voronezh is the best.

PUBLICATIONS OF U. S. DEPARTMENT OF AGRICULTURE TREATING OF CEREAL PRODUCTION IN THE SOUTHERN GREAT PLAINS.

AVAILABLE FOR FREE DISTRIBUTION.

Sixty-Day and Kherson Oats. (Farmers' Bulletin 395.)
Corn Cultivation. (Farmers' Bulletin 414.)
Seed Corn. (Farmers' Bulletin 415.)
Oats: Growing the Crop. (Farmers' Bulletin 424.)
Barley: Growing the Crop. (Farmers' Bulletin 443.)
The Smuts of Wheat, Oats, Barley, and Corn. (Farmers' Bulletin 507.)
Durum Wheat. (Farmers' Bulletin 534.)
Milo as a Dry-Land Grain Crop. (Farmers' Bulletin 322.)
Better Grain-Sorghum Crops. (Farmers' Bulletin 448.)
Kafir as a Grain Crop. (Farmers' Bulletin 552.)
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